

Name:

Date:

## Exam: Function Reflections (Solution version 25)

1. Let function  $f$  be defined by the polynomial below:

$$f(x) = -6x^4 + 5x^3 - 2x^2 + 7x + 8$$

Draw lines that match each function reflection with its polynomial:

Reflections

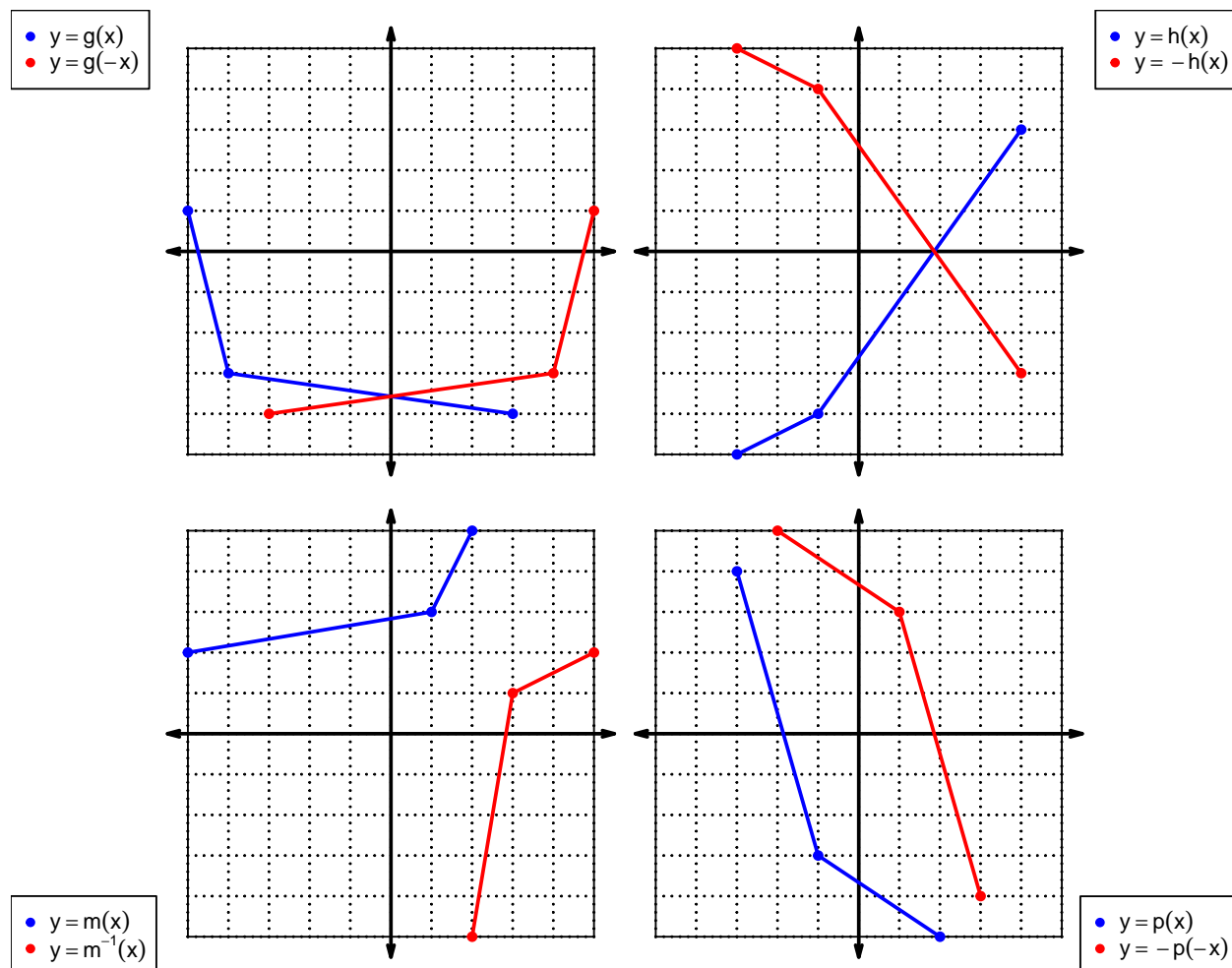
Polynomials

$$f(-x) \quad \bullet \text{---} \bullet \quad -6x^4 - 5x^3 - 2x^2 - 7x + 8$$

$$-f(x) \quad \bullet \text{---} \bullet \quad 6x^4 - 5x^3 + 2x^2 - 7x - 8$$

$$-f(-x) \quad \bullet \text{---} \bullet \quad 6x^4 + 5x^3 + 2x^2 + 7x - 8$$

2. In each  $xy$  plane shown below, a function is graphed with blue. Draw the indicated reflections (as a second curve, indicated in legend) with black (or with whatever you have). The  $x$  axis is horizontal and the  $y$  axis is vertical (as typical), and the scale is equal on both axes.



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For all questions on this page, the functions  $f$ ,  $g$ , and  $h$  are defined by the table below.

$x$	$f(x)$	$g(x)$	$h(x)$
1	8	2	5
2	9	4	7
3	4	9	2
4	6	3	1
5	3	5	6
6	2	1	3
7	1	7	4
8	5	6	8
9	7	8	9

3. Evaluate  $g(2)$ .

$$g(2) = 4$$

4. Evaluate  $h^{-1}(5)$ .

$$h^{-1}(5) = 1$$

5. Assuming  $g$  is an **odd** function, evaluate  $g(-9)$ .

If function  $g$  is odd, then

$$g(-9) = -8$$

6. Assuming  $f$  is an **even** function, evaluate  $f(-3)$ .

If function  $f$  is even, then

$$f(-3) = 4$$

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7. A function,  $f$ , is **even** if  $f(x) = f(-x)$  for all  $x$  in the domain. A function,  $g$ , is **odd** if  $g(x) = -g(-x)$  for all  $x$  in the domain.

Let polynomial  $p$  be defined with the following equation:

$$p(x) = x^2 - 1$$

- a. Express  $p(-x)$  as a polynomial in standard form.

$$p(-x) = (-x)^2 - 1$$

$$p(-x) = x^2 - 1$$

- b. Express  $-p(-x)$  as a polynomial in standard form.

$$-p(-x) = -(x^2 - 1)$$

$$-p(-x) = -x^2 + 1$$

- c. Is polynomial  $p$  even, odd, or neither?

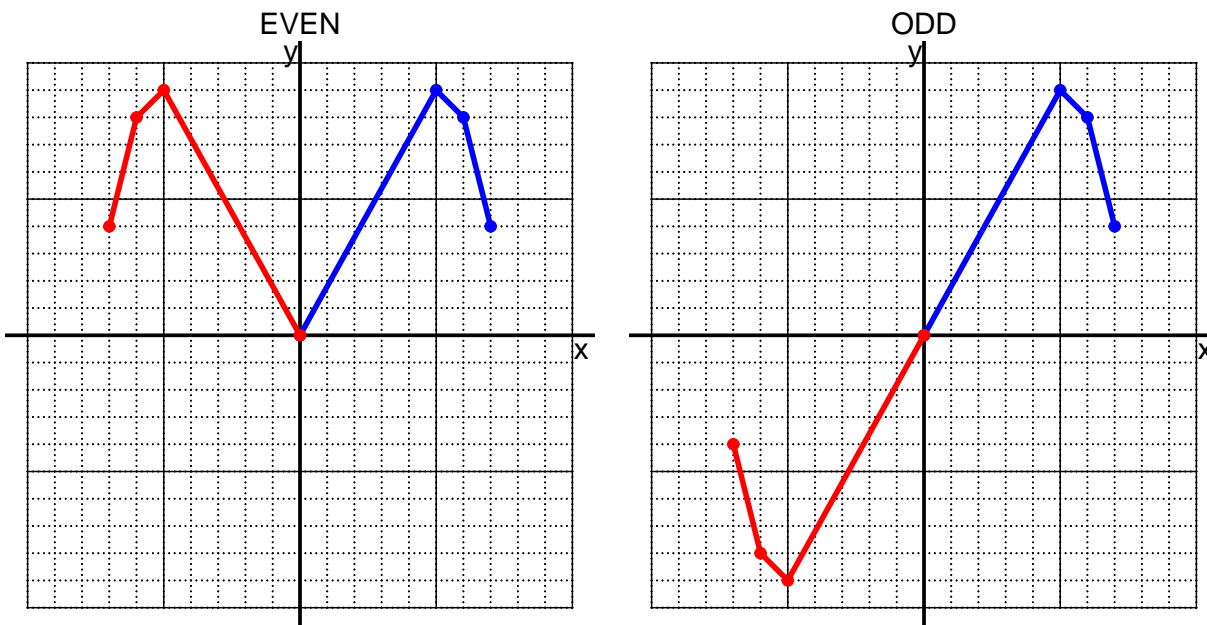
even

- d. Explain how you know the answer to part c.

We see that  $p(x) = p(-x)$  for all  $x$  because  $p(x)$  and  $p(-x)$  are equivalent polynomials. Thus function  $p$  satisfies the criterion for being an even function.

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8. I have drawn half of a function. Draw the other half to make it even or odd.



9. Let function  $f$  be defined with the equation below.

$$f(x) = 5(x + 4)$$

a. Evaluate  $f(9)$ .

step 1: add 4

step 2: multiply by 5

$$f(9) = 5((9) + 4)$$

$$f(9) = 65$$

b. Evaluate  $f^{-1}(75)$ .

step 1: divide by 5

step 2: subtract 4

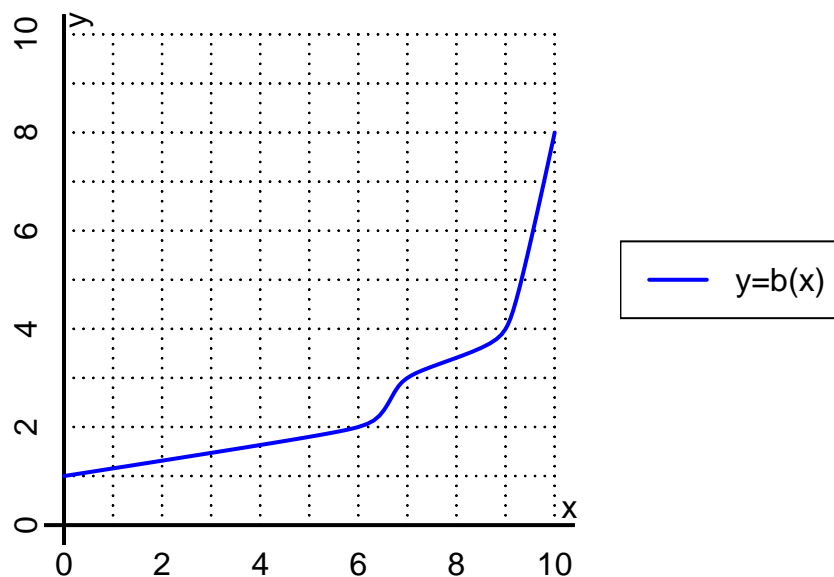
$$f^{-1}(x) = \frac{x}{5} - 4$$

$$f^{-1}(75) = \frac{(75)}{5} - 4$$

$$f^{-1}(75) = 11$$

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10. The function  $b$  is represented by the curve  $y = b(x)$  graphed below.



a. Evaluate  $b(6)$ .

$$b(6) = 2$$

b. Evaluate  $b^{-1}(3)$ .

$$b^{-1}(3) = 7$$

## Exam: Function Reflections (Solution version 25)

11. Function  $f$  is defined by the table below.

a. Complete the columns for  $-f(x)$  and  $f(-x)$  and  $-f(-x)$ .

$x$	$f(x)$	$-f(x)$	$f(-x)$	$-f(-x)$
-2	-3	3	3	-3
-1	6	-6	-6	6
0	0	0	0	0
1	-6	6	6	-6
2	3	-3	-3	3

b. Is function  $f$  even, odd, or neither?

odd

c. How do you know the answer to part b?

Function  $f$  is odd because column  $-f(-x)$  matches column  $f(x)$  exactly.